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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/788,892	02/27/2004	Don C. Powell	303.863US1	4563

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EXAMINER	
LINDSAY JR, WALTER LEE	

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 09/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/788,892	POWELL, DON C.	
	Examiner	Art Unit	
	Walter L. Lindsay, Jr.	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *34 and 35* is/are allowed.

6)☒ Claim(s) *1-33 and 36-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to an Amendment filed on 6/17/2005.

Currently, claims 1-39 are pending.

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-24, 26-33 and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hochberg et al. (U.S. Patent No. 4,981,724 dated 1/1/1991) in view of Ishitani (U.S. Patent No. 5,330,936 dated 7/19/1994).

Hochberg shows the method substantially as claimed in the text as: heating a chamber (col. 11, lines 23-30), within which a substrate is located (col. 11, lines 3-10), to a temperature sufficient to thermally decompose an oxidizing component (col. 11, lines 30-45); and passing reaction gasses over the substrate to deposit the dielectric film (col. 11,lines 30-45), wherein the reaction gasses include a silicon bearing component (col. 12, lines 5-20), the oxidizing component (col. 11, lines 43), and a chloride component (col. 12, line 22) (claim 1). Hochberg teaches that the dielectric film is an oxide film (col. 11, line 33) (claim 2). Hochberg teaches that the reaction gasses further include ammonia, and the dielectric film is an oxynitride film (col. 13, lines 17-20) (claim 3). Hochberg teaches that the silicon bearing component consists essentially of one or more halated silanes (col. 12, line 19) (claim 4). Hochberg teaches that the silicon bearing component includes at least one component selected from the group consisting of silane, disilane, monochlorosilane, dichlorosilane, trichlorosilane, and tetra chlorosilane, in any combination (col. 12, line 19) (claim 5). Hochberg teaches that the chloride component includes at least one component selected from the group consisting of hydrogen chloride and chlorine, in any combination (col. 2, lines 45-55) (claim 6). Hochberg teaches that the substrate is heated to a temperature in a range between 700 degrees C. and 950 degrees C., inclusive (col. 12, lines 10-15) (claim 7). Hochberg teaches that the reaction gasses have a total pressure in a range between 50 milliTorr and 4000 milliTorr inclusive (col. 13, lines 63-64) (claim 8).

Hochberg shows the method substantially as claimed in the text as: heating a substrate, within a chamber, to a temperature sufficient to thermally decompose an

oxidizing component (col. 17, lines 18-19); and passing reaction gasses over the substrate, wherein the reaction gasses include a silicon bearing component (col. 17, lines 24-25), the oxidizing component (col. 17, line 23) and chlorine (col. 12, lines 15-20) (claim 9). Hochberg teaches that the silicon bearing component consists essentially of dichlorosilane (col. 12, line 19) (claim 10). Hochberg teaches that the oxidizing component consists essentially of nitrous oxide (col. 11, line 44) (claim 11). Hochberg teaches that the reaction gasses further include ammonia, and the dielectric film is an oxynitride film (col. 13, line 18-20) (claim 12).

Hochberg shows the method substantially as claimed in the text as: heating a substrate, within a chamber (col. 11, lines 3-10), to a temperature sufficient to thermally decompose an oxidizing component (col. 11, lines 23-30); and passing reaction gasses over the substrate, wherein the reaction gasses include a silicon bearing component (col. 12, lines 5-20), the oxidizing component (col. 11, line 43) (claim 13). Hochberg teaches that the silicon bearing component consists essentially of dichlorosilane (col. 12, line 19) (claim 14). Hochberg teaches that the oxidizing component consists essentially of nitrous oxide (col. 11, line 44) (claim 15). Hochberg teaches that the reaction gasses further include ammonia, and the dielectric film is an oxynitride film (col. 13, lines 17-18) (claim 16).

Hochberg shows the method substantially as claimed in the text as: heating a substrate, within a chamber, to a temperature sufficient to thermally decompose an oxidizing component (col. 11, lines 3-10), and passing a reaction gasses over the substrate, wherein the reaction gasses include a silicon bearing component (col. 11, line

4), the oxidizing component (col. 11, lines 3-10), an ammonia component (col. 13, lines 17-18), and a chloride component (col. 2, lines 45-55) (claim 17). Hochberg teaches that the silicon bearing component consists essentially of dichlorosilane (col. 12, line 19) (claim 18). Hochberg teaches that the oxidizing component consists essentially of nitrous oxide (col. 11, line 44) (claim 19). Hochberg teaches that the chloride component consists essentially of chlorine (col. 2, lines 45-55) (claim 21).

Hochberg shows the method substantially as claimed in the text as: heating a substrate to a temperature sufficient to thermally decompose an oxidizing component (col. 17, lines 18-19); and passing reaction gasses over the substrate, wherein the gas flow includes a precursor component (col. 17, lines 24-25), an oxidizing component (col. 17, line 23), an ammonia component (col. 13, lines 17-18), and a chloride component (col. 2, lines 44-45) (claim 22). Hochberg teaches that the precursor component includes at least one component selected from the group consisting of a silicon bearing component, a tantalum bearing component, and an aluminum bearing component, in any combination (col. 17, lines 24-25) (claim 23). Hochberg teaches that the precursor component includes at least one component selected from the group consisting of silane, disilane, monochlorosilane, dichlorosilane, trichlorosilane, and tetrachlorosilane, in any combination (col. 12, line 19) (claim 24). Hochberg teaches that the precursor component consists essentially of an aluminum bearing component (col. 2, lines 46-49) (claim 26). Hochberg teaches that the oxidizing component consists essentially of nitrous oxide (col. 11, line 44) (claim 27). Hochberg teaches that the chloride component consists essentially of chlorine (col. 2, lines 44-55) (claim 29).

Hochberg shows the method substantially as claimed in the text as: heating a substrate, within a chamber (col. 11, lines 3-10); and depositing a dielectric layer over the substrate by passing reaction gasses over the substrate, wherein the reaction gasses include a silicon bearing component (col. 11, line 4), an oxidizing component (col. 11, lines 3-10), and a chloride component (col. 2, lines 45-55) (claim 30). Hochberg teaches that the reaction gasses further includes an ammonia component, and the dielectric layer is an oxynitride layer having thermal properties that make the semiconductor device suitable for use as an optical waveguide (col. 13, lines 17-18) (claim 31).

Hochberg shows the method substantially as claimed in the text as: heating a silicon substrate, in a furnace deposition tube (col. 8, lines 8-16), to a temperature in a range of 700 degrees C. to 950 degrees C., inclusive (col. 11, lines 1-2), and thermally oxidizing the silicon substrate, in the furnace tube, using gaseous reactants, which include a chloride component, dichlorosilane, and nitrous oxide (col. 2, lines 44-45; col. 11, line 44; col. 12, line 19) (claim 36). Hochberg teaches that the chloride component includes chlorine (col. 2, lines 45-55) (claim 38). Hochberg teaches the step of thermally oxidizing the silicon substrate further includes using ammonia as one of the gaseous reactants (col. 2, lines 46-49) (claim 39).

Hochberg lacks anticipation only in not explicitly teaching that: 1) the silicon bearing component and the chloride component are included within distinct ones of the reaction gasses introduced into the chamber (claim 1); 2) the silicon bearing component and the chlorine are included within distinct ones of the reaction gasses introduced into

the chamber (claim 9); 3) the silicon bearing component and the hydrogen chloride are included within distinct ones of the reaction gasses introduced into the chamber (claim 13); 4) the silicon bearing component and the chloride component are included within distinct ones of the reaction gasses introduced into the chamber (claim 17); 5) the chloride component consists essentially of nitrous oxide (claim 20); 6) the precursor component and the chloride component are included within distinct ones of the reaction gasses introduced into the chamber (claim 22); 7) the chloride component consists essentially of hydrogen chloride (claim 28); 8) the silicon bearing component and the chloride component are included within distinct ones of the reaction gasses introduced into the chamber (claim 30); 9) a trench is etched into the substrate, wherein the dielectric layer is an oxide deposited on an inner surface of the trench (claim 32); 10) a native oxide layer is allowed to form prior to depositing the dielectric layer; depositing a nitride layer over the native oxide layer prior to depositing the dielectric layer; and wherein depositing the dielectric layer includes also including an ammonia component in the gas flow, so that the dielectric layer is an oxynitride layer (claim 33); 11) the chloride component and the dichlorosilane are included in distinct gasses introduced into the furnace deposition tube (claim 36); and 12) the chloride component includes hydrogen chloride (claim 37).

Ishitani shows a method of depositing a dielectric film and method of fabricating a semiconductor device. Ishitani teaches doping the source gas of ammonia or silane or dichlorosilane with hydrogen chloride gas (col. 2, lines 50-57). Ishitani discloses the dielectric layer is an oxide deposited on an inner surface of a trench etched into

substrate (col. 2, lines 24-35). Ishitani teaches allowing a native oxide layer to form prior to depositing the dielectric layer (col. 2, lines 51-55); depositing a nitride layer over the native oxide layer prior to depositing the dielectric layer (col. 2, lines 62-65), and wherein depositing the dielectric layer includes also including an ammonia component in the gas flow (col. 2, line 54). The process helps to eliminate the problems for example, particle-pollution, metal-pollution and damaging of the device with deterioration of characteristics of the device. Further, unnecessary time and higher costs are required for fabrication of the device (col. 2, lines 35-42).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Hochberg, by having the silicon bearing and chloride component being in distinct reaction gasses, (dichlorosilane and HCL), as taught by Ishitani, with the motivation that Ishitani teaches a process helps to eliminate the problems for example, particle-pollution, metal-pollution and damaging of the device with deterioration of characteristics of the device. Further, unnecessary time and higher costs are required for fabrication of the device.

5. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hochberg et al. (U.S. Patent No. 4,981,724 dated 1/1/1991) in view of Ishitani (U.S. Patent No. 5,330,936 dated 7/19/1994) as applied to claim 22 above, and further in view of Chung et al. (U.S. Patent No. 6,838,125 filed 7/10/2002).

Hochberg as modified by Ishitani shows the method substantially as claimed and as described in the preceding paragraph.

Hochberg as modified by Ishitani lacks anticipation only in not explicitly teaching that: 1) the precursor component consists essentially of a tantalum bearing component (claim 25).

Chung teaches a method of film deposition using a precursor component consisting essentially of a tantalum bearing component (col. 8, lines 1-7). It would have been obvious to one having ordinary skill in the art to have used a tantalum bearing component as the precursor in Hochberg for the purpose of forming a metal film with tantalum (col. 7, lines 66-67).

Response to Arguments

6. Applicant's arguments filed 6/17/2005 have been fully considered but they are not persuasive. The examiner views the fact that Ishitani teaches that HCl and dichlorosilane are in the reaction chamber and are distinguishable that this reads on distinct gases and would therefore read on the invention as written.

Allowable Subject Matter

7. Claims 34 and 35 are allowed.

8. The following is a statement of reasons for the indication of allowable subject matter: the prior art, either singly or in combination fails to anticipate or render obvious, the limitations of:

...wherein the semiconductor device includes one or more gates, and wherein the dielectric layers forms one or more spacers for isolating the one or more gates from one or more contacts, as required by claim 34; and

... wherein the semiconductor device includes one or more gates and one or more metal layers, and wherein the dielectric layer forms a cap over the one or more gates and the one or more metal layers, as required by claim 35.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter L. Lindsay, Jr.
Examiner
Art Unit 2812

WLL
August 30, 2005